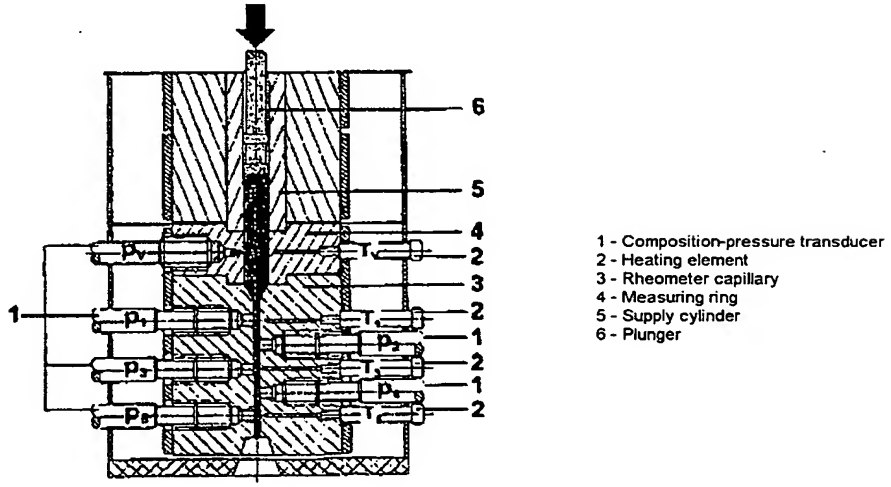
Figures

Figure 1: Cross-sectional illustration of the test chamber of the high-pressure capillary rheometer with slot die



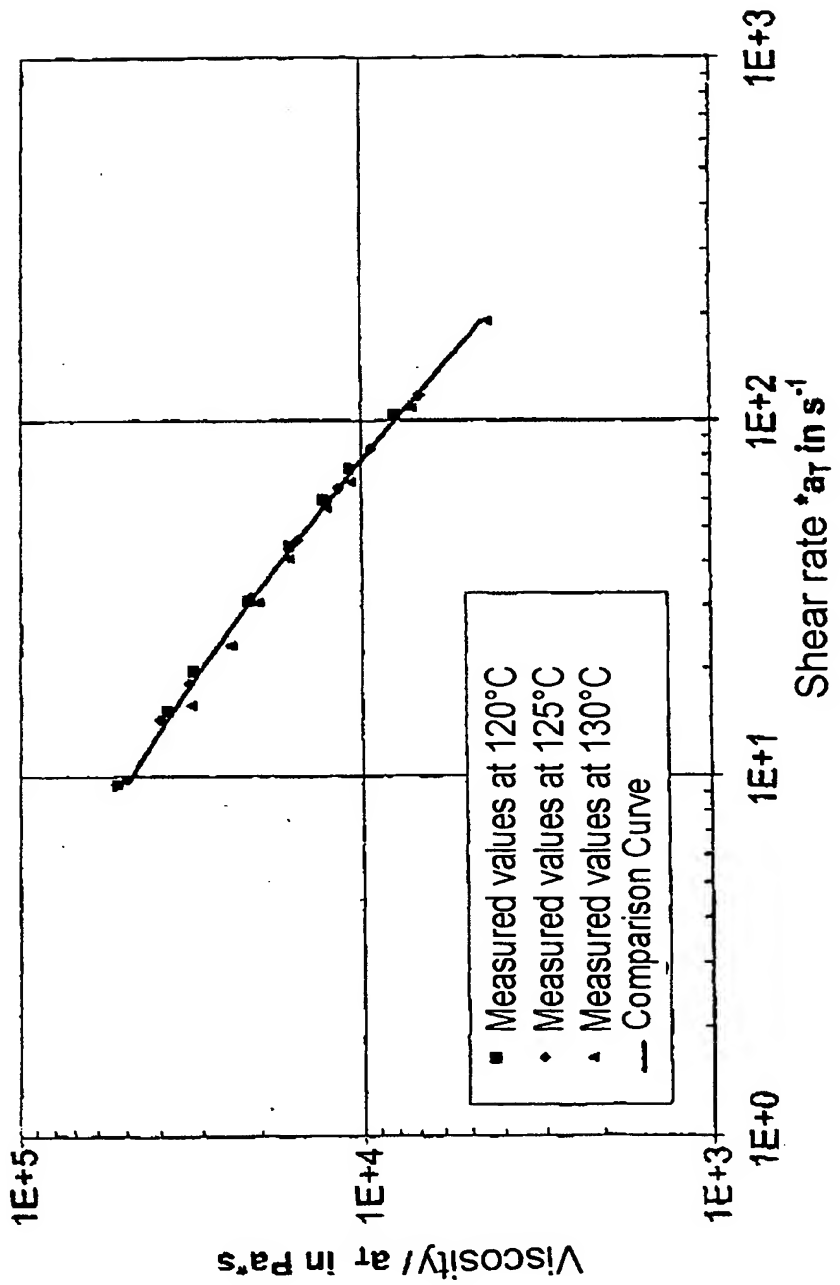


Figure 2: Temperature-invariant representation of the viscosity curves of the uncrosslinked compound I at three temperatures (Reference temperature To = 125°C)

New patent claims

1. A composite material with a proportion of wood and with a proportion of crosslinked plastics,

characterized by

a proportion of from 55 to 90% by weight of wood and a proportion of from 45 to 10% by weight of crosslinked plastics, where the proportion of wood has been dispersed in the form of particles in the crosslinked plastics, and the crosslinked plastics are crosslinked melamine resin ethers or mixtures composed of from 10 to 90% by weight of partially crosslinked thermoplastics and of from 90 to 10% by weight of crosslinked melamine resin ethers.

2. The composite material as claimed in claim 1, characterized in that the proportion of wood is present in the form of wood flour, wood particles, wood granules, wood fibers, and/or wood shavings.

3. The composite material as claimed in claim 1 and 2, characterized in that the proportion of wood is in particular in the form of mixtures composed of wood fibers and of wood shavings in a ratio of from 1:10 to 10:1 at from 65 to 80% by weight, and the proportion of crosslinked plastics is from 35 to 20% by weight.

4. The composite material as claimed in at least one of the preceding claims, characterized in that the crosslinked plastics are mixtures composed of partially crosslinked EVA copolymers whose vinyl acetate content is from 25 to 40% by weight and of crosslinked melamine resin ethers in a mixing

ratio of from 2:1 to 1:5.

5. The composite material as claimed in at least one of claims 1 to 4, characterized in that from 3 to 10% by weight of flame retardant, from 0.1 to 2% by weight of pigments, from 0.1 to 5% by weight of stabilizers, and/or from 0.1 to 5% by weight of auxiliaries are present, in each case based on the entirety of wood and plastics.

6. The composite material as claimed in claim 5, characterized in that the stabilizers are UV absorbers and/or free-radical scavengers.

7. The composite material as claimed in claim 5 or 6, characterized in that the auxiliaries are lubricants of the type represented by zinc stearate, calcium stearate, and/or magnesium stearate, and/or release agents of the type represented by talc, aluminum oxide, sodium carbonate, calcium carbonate, silica, and/or polytetrafluoroethylene powder.

8. The composite material as claimed in at least one of the preceding claims, characterized in that the crosslinked melamine resin ethers and the partially crosslinked thermoplastics are present in foamed form.

9. The composite material as claimed in at least one of the preceding claims, characterized in that it is present in the form of a sheet, profile, or injection molding.

10. The composite material as claimed in at least one of the preceding claims, characterized in that the crosslinked melamine resin ethers are crosslinked etherified melamine resin condensates which are free from hydroxymethyleneamino groups bonded to the triazine rings of the melamine resin condensate, and from $-NH-CH_2-O-CH_2-NH-$ groups linking triazine rings, and in which the non-crosslinked etherified melamine resin condensates have been effected via etherification of the hydroxymethylamino groups of the non-etherified melamine resin condensates via C_1-C_{18} alcohols and/or via polyols of the type represented by diols, triols, and/or tetrols with molecular weights of from 62 to 20 000, and in which the

non-crosslinked etherified melamine resin condensates have been hardened thermally and/or via acidifier.

11. The composite material as claimed in at least one of the preceding claims, characterized in that the partially crosslinked thermoplastics are partially crosslinked ethylene-vinyl acetate copolymers, partially crosslinked partially hydrolyzed ethylene-vinyl acetate copolymers, partially crosslinked thermoplastic polyurethanes, partially crosslinked high-molecular-weight aliphatic and/or aromatic-aliphatic polyethers, and/or partially crosslinked aliphatic and/or aromatic-aliphatic polyesters, preferably partially crosslinked polycaprolactones, and/or unsaturated polyesters.

12. A process for production of a composite material as claimed in claim 1,

characterized in that

the composite material is produced by an extruder process, where in a

a) first stage of the process in a first extruder segment a melt mixture composed of melamine resin ethers, wood, and, if appropriate, thermoplastics is prepared, the melt mixture is devolatilized after homogenization, and, in a second extruder segment, hardener, thermally decomposing free-radical generator, and/or blowing agent are fed into the melt mixture, and are homogenized in the melt mixture, where flame retardants, pigments, stabilizers, and/or auxiliaries can be fed in the first and/or second extruder segment, and in a

b) second stage of the process, the wood-containing melt mixture is either heated in a third extruder segment, discharged via a die with crosslinking and, if appropriate, foaming, and drawn off in the form of a semifinished product, or is discharged from the extruder, and pelletized, and the pellets in a

c) third stage of the process are processed in presses, extruders, or injection-molding machines with crosslinking and, if appropriate, foaming to give semifinished products or molded materials.

13. The process as claimed in claim 12, characterized in that the length of the extruders is from 30 to 60 D, the melt mixture in the first extruder segment is prepared at melt temperatures of from 110 to 170°C, the feed in the second extruder segment takes place at melt temperatures of from 100 to 150°C, the heating in the third extruder segment takes place to from 150 to 240°C, and the processing in the third stage of the process takes place at temperatures of from 150 to 240°C.

14. The process as claimed in claim 12 or 13, characterized in that the melt mixture in the first stage of the process is prepared from melamine resin ethers whose weight-average molecular weight is from 1500 to 200 000 and whose molar melamine/formaldehyde ratio is from 1:1.5 to 1:4.

15. The process as claimed in claim 12 or 13, characterized in that, prior to the first stage of the process, wood is impregnated, in mixers, with solutions or dispersions of melamine resin condensates in water or mixtures composed of water and C_1-C_4 alcohols, and is dried, where the melamine resin condensates are etherified melamine resin condensates and/or are melamine resin condensates partially etherified

with C_1-C_4 alcohols, the weight-average molecular weights of the condensates being from 150 to 50 000 and their molar melamine/formaldehyde ratio being from 1:1.5 to 1:4, and the melamine resin condensates comprise, if appropriate, up to 3% by weight of hardener, based on the melamine resin condensates, and then the melt mixture in the first stage of the process composed of the wood pre-impregnated with melamine resins and also of

- melamine resin ethers or
- thermoplastics or
- mixtures composed of melamine resin ethers and thermoplastics

is prepared.

16. The process as claimed in claim 15, characterized in that the solids content of the solutions or dispersions is from 20 to 80% by weight, the impregnation process takes place at from 80 to 120°C, the length of the extruders is from 30 to 60 D, the melt mixtures in the first extruder segment are prepared at melt temperatures of from 110 to 170°C, the feed in the second extruder segment takes place at melt temperatures of from 100 to 150°C, the heating in the third extruder segment takes place to temperatures of from 150 to 240°C, and the processing in the third stage of the process takes place at temperatures of from 150 to 240°C.

17. A process for production of a composite material as claimed in claim 1,

characterized in that

the composite material is produced by a sintering

process where in a

a) first stage of the process, mixtures composed of wood and of plastics which are composed of melamine resin ethers or which are composed of mixtures composed of melamine resin ethers and of thermoplastics, or are composed of thermoplastics, are sintered in high-speed mixers, the sinter mixture is cooled, and, after cooling, hardeners, thermally decomposing free-radical generators, and/or blowing agents, flame retardants, pigments, stabilizers, and/or auxiliaries are applied to the sinter mixture in the drum mixer, and in a

b) second stage of the process, the sinter mixture comprising wood, and comprising melamine resin ethers and, if appropriate, comprising thermoplastics is processed in presses, in extruders, or in injection-molding machines, with crosslinking and, if appropriate, foaming, to give semifinished products or molded materials.

18. The process as claimed in claim 17, characterized in that the sintering process in the first stage of the process takes place in high-speed mixers with residence times of from 3 to 30 min and final temperatures of from 90 to 180°C, the process of cooling of the sinter mixture takes place to temperatures of from 50 to 120°C, and the processing of the sinter mixture in the second stage of the process takes place at temperatures of from 150 to 240°C.

19. The process as claimed in at least one of claims 12 to 18, characterized in that the wood used is in the form of wood flour, wood particles, wood granules, wood fibers, or wood shavings, and comprises from 3 to 10% by weight of sodium borate or sodium borate/boric acid mixtures in a ratio by weight of from 1:9 to 9:1.

20. The process as claimed in at least one of claims 12 to 19, characterized in that the hardener used comprises aliphatic C_4-C_{18} carboxylic acids, aromatic C_7-C_{18} carboxylic acids, acidifiers of the type represented by blocked sulfonic acids, alkali metal salts, or ammonium salts of phosphoric acid, C_1-C_{12}-alkyl esters or C_2-C_8-hydroxyalkyl esters of C_7-C_{14}-aromatic carboxylic acids or of inorganic acids, salts of melamine or of guanamines with C_1-C_{18}-aliphatic carboxylic acids, or comprises anhydrides, half-esters or half-amides of C_4-C_{20} dicarboxylic acids, or comprises half-esters or half-amides of copolymers composed of ethylenically unsaturated C_4-C_{20} dicarboxylic anhydrides and of ethylenically unsaturated monomers of the type represented by

C_2-C_{20} olefins and/or C_8-C_{20} vinylaromatics, and/or salts of C_1-C_{12}-alkylamines and, respectively, alkanolamines with C_1-C_{18}-aliphatic, C_7-C_{14}-aromatic, or alkylaromatic carboxylic acids, or with inorganic acids of the type represented by hydrochloric acid, sulfuric acid, or phosphoric acid.

21. The use of composite materials as claimed in at least one of claims 1 to 11 in the construction industry, in particular for the production of windows, of doors, of cladding elements, and of roof elements in the outdoor sector, or else in the sports and leisure sector for garden furniture and outdoor seating, and for construction of playgrounds.